

Spot Safety Project Evaluation

Order # 41000008703

Spot Safety Project # 06-02-207

Spot Safety Project Evaluation of the Left Turn Lane Installation NC 55 (North Raleigh Street) at Dupree Street In Angier, Harnett County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator



Chad J. Neilson

10/1/2010

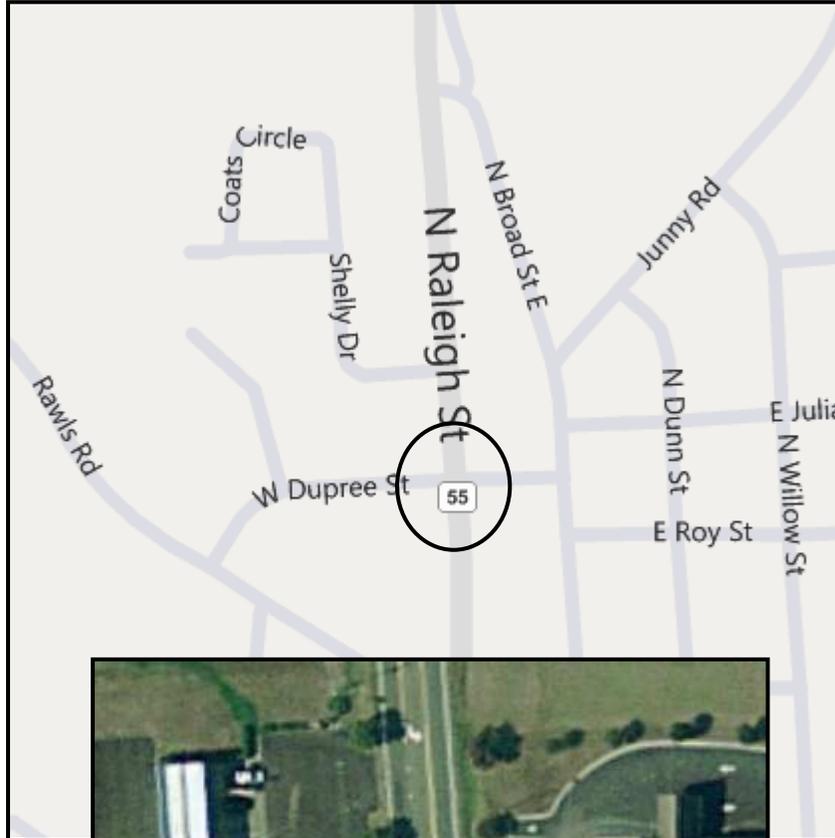
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-02-207 located at the Intersection of NC 55 (North Raleigh Street) and Dupree Street in Angier, Harnett County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of left turn lanes on both approaches of NC 55 (North Raleigh Street) at the subject location. NC 55 (North Raleigh Street) and Dupree Street are two-lane facilities at the subject intersection with unposted speed limits of 35 mph on all approaches. The subject location is a four-leg crossroads intersection, which is controlled by posted stop signs on the Dupree Street approaches.

The original statement of problem was existence of congestion and delay resulting from NC 55 vehicles waiting to turn left and impeding traffic flow.

The initial crash analysis was completed from January 1, 1999 to December 31, 2001 with sixteen (16) reported crashes, of which seven (7) were deemed correctable. The final completion date for the improvement at the subject intersection was on September 30, 2005 with a total cost of \$150,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period were the months of August through October 2005. The before period consisted of reported crashes from November 1, 2000 through July 31, 2005 (4 years and 8 months); and the after period consisted of reported crashes from November 1, 2005 through July 31, 2010 (4 years and 8 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map, aerial map, and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Mainline (NC 55 – North Raleigh Street) Approach Rear-Ends to the intersection were the target crashes for the applied countermeasure.

Treatment Information	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	10	4	- 60.00 %
Total Crash Severity Index	1.00	1.00	0.00 %
Target Crashes	5	0	- 100.0 %
Target Crash Severity Index	1.00	0.00	- 100.0 %
Volume (2003, 2008)	16,000	18,000	12.50 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	0	N/A
Class C Injury Crashes	0	0	N/A
Total Injury Crashes	0	0	N/A

The naive before and after analysis at the treatment location resulted in a sixty (60) percent decrease in Total Crashes, one-hundred (100) percent elimination of Target Crashes, and a zero (0) percent change in the Total Severity Index. The before period ADT year was 2003 and the after period ADT year was 2008.

Results and Discussion

Referencing the *Collision Diagrams*, the before period presented five (5) NC 55 rear-end target crashes. There were two (2) southbound rear-end target crashes and three (3) northbound rear-end target crashes. One of the northbound target crashes was categorized as a head-on type of crash, however the at-fault driver swerved to avoid a rear-end crash. After the left turn lanes were installed, there were zero (0) NC 55 rear-end target crashes approaching the intersection.

The calculated benefit to cost ratio for this project is **0.35 considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.29**. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Photos were provided for this location by Google Street View for all four approaches of this intersection. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

TREATMENT SITE PHOTOS



Looking North on NC 55(N. Raleigh Street)



Looking South on NC 55 (N. Raleigh Street)



Looking East on Dupree Street



Looking West on Dupree Street

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: NC 55 (N. Raleigh St) @ Dupree St		BY: C Neilson						
COUNTY: Harnett		DATE: 9/29/2010						
FILE NO.: SS 06-02-207								
DETAILED COST:	TYPE IMPROVEMENT - Left-turn lane Installation							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$150,000	20	0.102	\$15,278			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$150,000	20	0.102	\$15,278			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$200			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$15,478			
	TOTAL COST OF PROJECT=				\$150,000			
COMPREHENSIVE COST REDUCTION:								
	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES							
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.78	0	0.00	0	0.00	10	2.09	\$8,996
AFTER	4.75	0	0.00	0	0.00	4	0.84	\$3,621
						Annual Benefits from Crash Cost Savings		\$5,375
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$10,103)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.35		
TOTAL COST OF PROJECT		-	\$150,000	COMPREHENSIVE B/C RATIO		-	0.35	

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: NC 55 (N. Raleigh St) @ Dupree St		BY: C Neilson						
COUNTY: Harnett		DATE: 9/29/2010						
FILE NO.: SS 06-02-207								
DETAILED COST:	TYPE IMPROVEMENT - Left-turn lane Installation							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$150,000	20	0.102	\$15,278			
		\$0	0	0.000	\$0			
	Right-of-Way	\$0	0	0.000	\$0			
	TOTALS	\$150,000	20	0.102	\$15,278			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$200			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$15,478			
	TOTAL COST OF PROJECT=				\$150,000			
COMPREHENSIVE COST REDUCTION:								
	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES							
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.78	0	0.00	0	0.00	5	1.05	\$4,498
AFTER	4.75	0	0.00	0	0.00	0	0.00	\$0
						Annual Benefits from Crash Cost Savings		\$4,498
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	(\$10,980)		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	0.29		
TOTAL COST OF PROJECT		-	\$150,000	COMPREHENSIVE B/C RATIO		-	0.29	

NC 55 (North Raleigh Street)

35 MPH

Dupree Street

35 MPH

35 MPH

Dupree Street

35 MPH

NC 55 (North Raleigh Street)

Note: Crash # 10 - Head-On crash due to driver avoiding a Rear-End crash

SS# 06-02-207
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 Harnett County
 BEFORE Period
 11/1/00 - 7/31/05



LEGEND

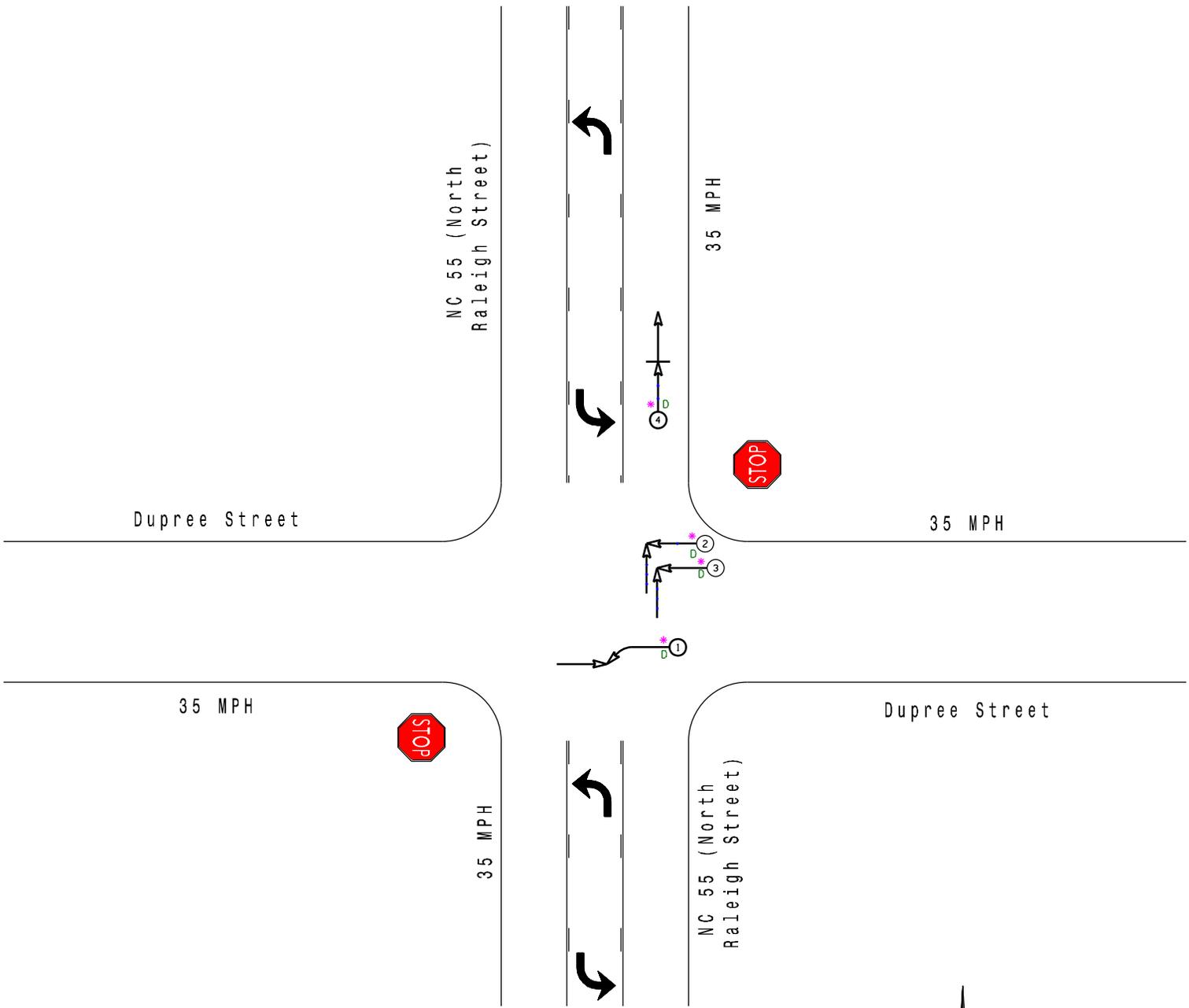
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		ONLY
	RAN OFF ROAD				70 AND UP		
					SPEED UNKNOWN		



N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 9-29-2010 Prepared By: C Neilson



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 Harnett County
 AFTER Period
 11/1/05 - 7/31/10



LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
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	REAR END		FATALITY		60 MPH TO 69		ONLY
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